

SUPPORTING DIGITAL FUTURE

Solutions for digitalization of industries, cities and buildings

FLOWBOX overview

Q2 | 2021

www.flowbox.com



ABOUT US

Ambitious
Fast-growing
Ahead
Global

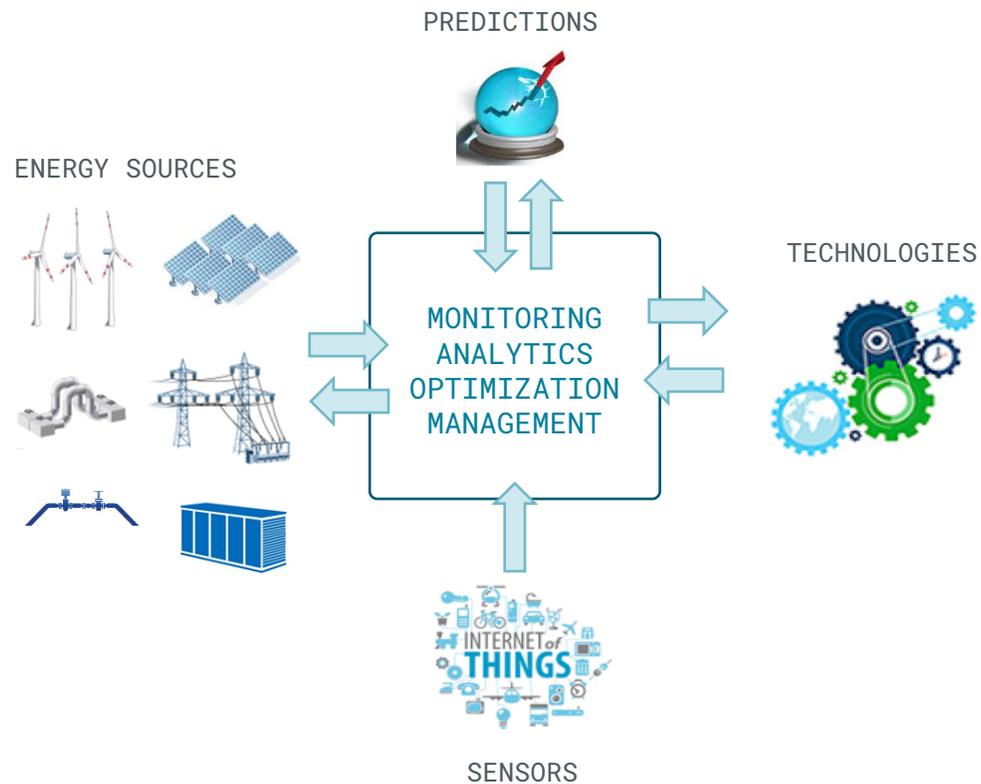
- + Lean, agile, global-oriented company based in Prague, Czech Republic
- + Development of leading hardware-agnostic digitalization platform IID
- + A unique holistic knowledge of multi-industry digital technologies
- + 120+ installations, 20 countries, 30 experts in team





CORE COMPETENCIES

FLOWBOX = (SW DEVELOPMENT + SYSTEMS INTEGRATION) ENERGY TRANSITION



- + **Development of Intelligent Integrated Digitalization (IID) platform** – hardware agnostic; supporting more than 500 industrial, IT and telecom technology systems; robust SW architecture designed for performance and safety; big data analytics as a main tool
- + **Systems integration, architecture, and solution design** – a unique know-how to understand and ability to integrate telecommunications, IT, IoT, energy and industrial automation systems/networks with relevant hardware



FLOWBOX INTEGRATES MULTIPLE SYSTEMS INTO OPTIMIZED ECOSYSTEM

- + **Management of energy flows** – integration of telecommunication, IT and industrial automation technology layers; move from monitoring to **big data analytics, proactive control and optimization**
- + **Making smart buildings smarter** - energy optimization, integration of stand-alone technology systems to work in optimized ecosystem, responsive and responsible buildings, support of EPBD (EU) 2018/844 for energy management
- + **Digitalization of operations in manufacturing** – collection of productivity parameters; monitoring of critical data, aggregation, visualization, alerts, predictive actions to avoid outages or production slowdown, ISO 50001 compliant management system
- + **Management of energy distribution and microgrids** – solutions for DSOs, DER management, demand response
- + **Digitalization of cities** – data collection via IoT networks; dynamic parking, waste management, biolight control

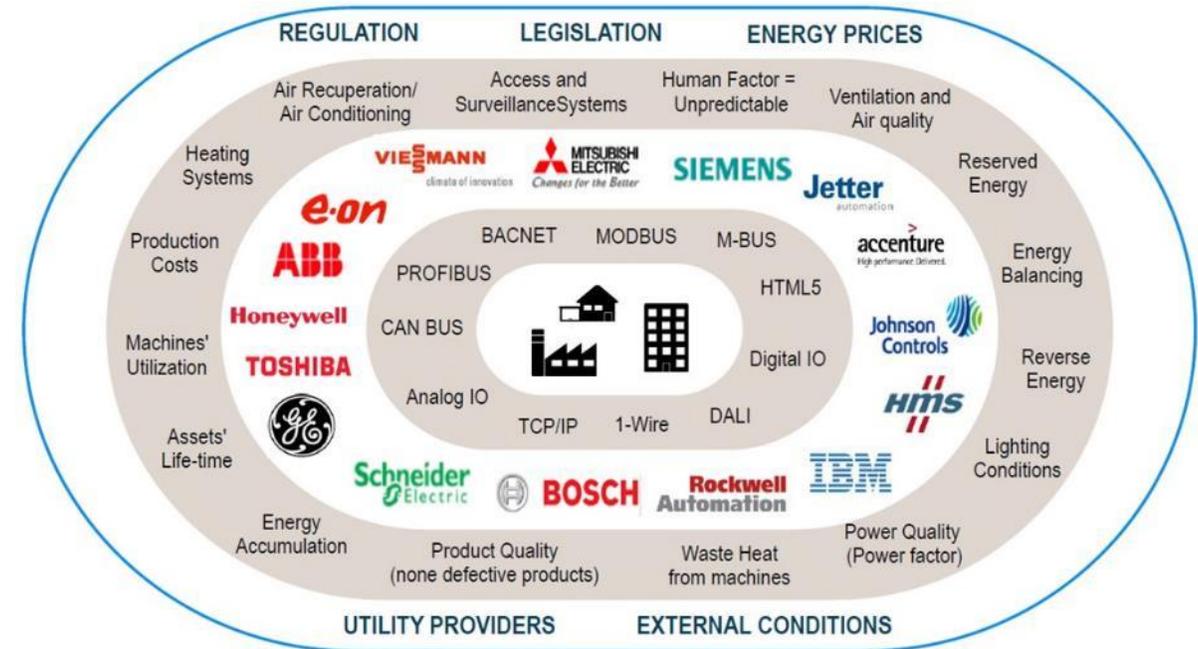
WE ADDRESS THE CURRENT 'LOCAL' OPERATIONAL CHALLENGES

INTERNAL CHALLENGES

- + Ineffective operation and energy usage
- + Lack of oversight
- + Limited predictability and prevention
- + Lack of automation

EXTERNAL CHALLENGES

- + Reserved energy and energy prices
- + Compliance with legal regulations
- + Green deal / CO₂ reduction requirements
- + Need for energy management certification and EU legislation compliancy (e.g. ISO 50001, EU 2018/844)



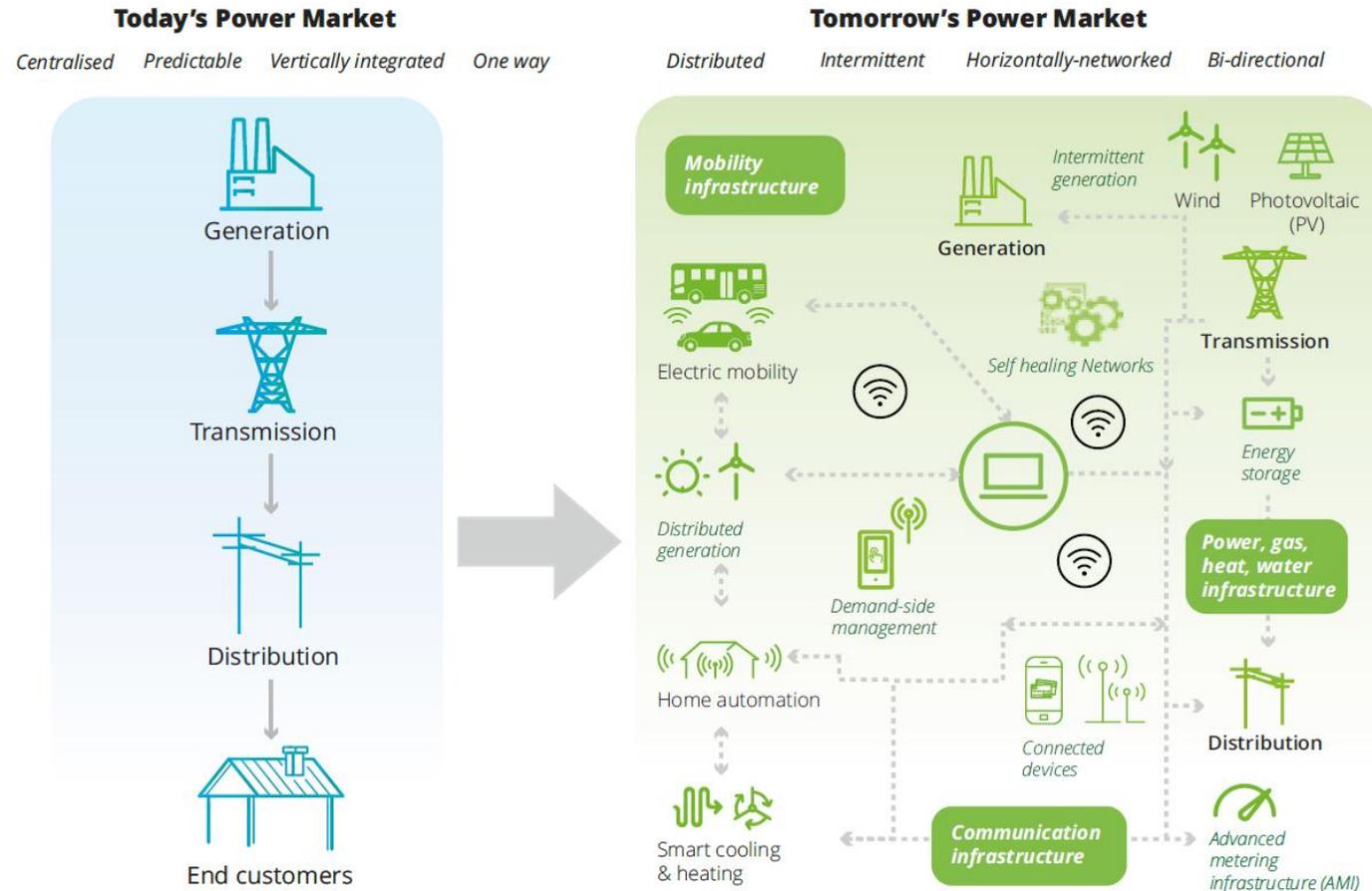
... AND THE FUTURE 'GLOBAL' CHALLENGES, MAINLY ENERGY TRANSITION

'3D' MACRO TRENDS

Decarbonization

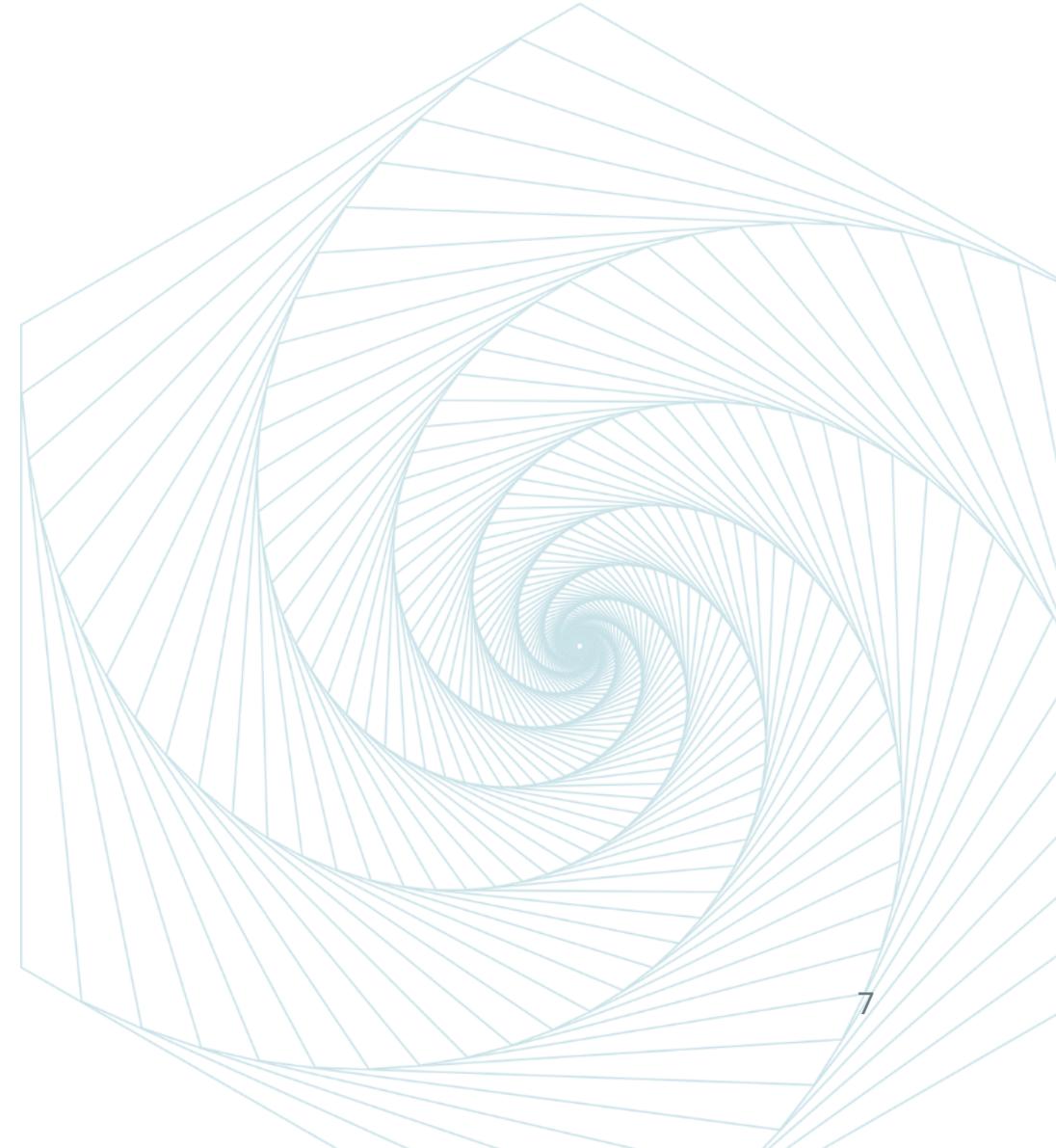
Decentralization

Digitalization



SOLUTIONS FOR DIGITALIZATION

Our product portfolio



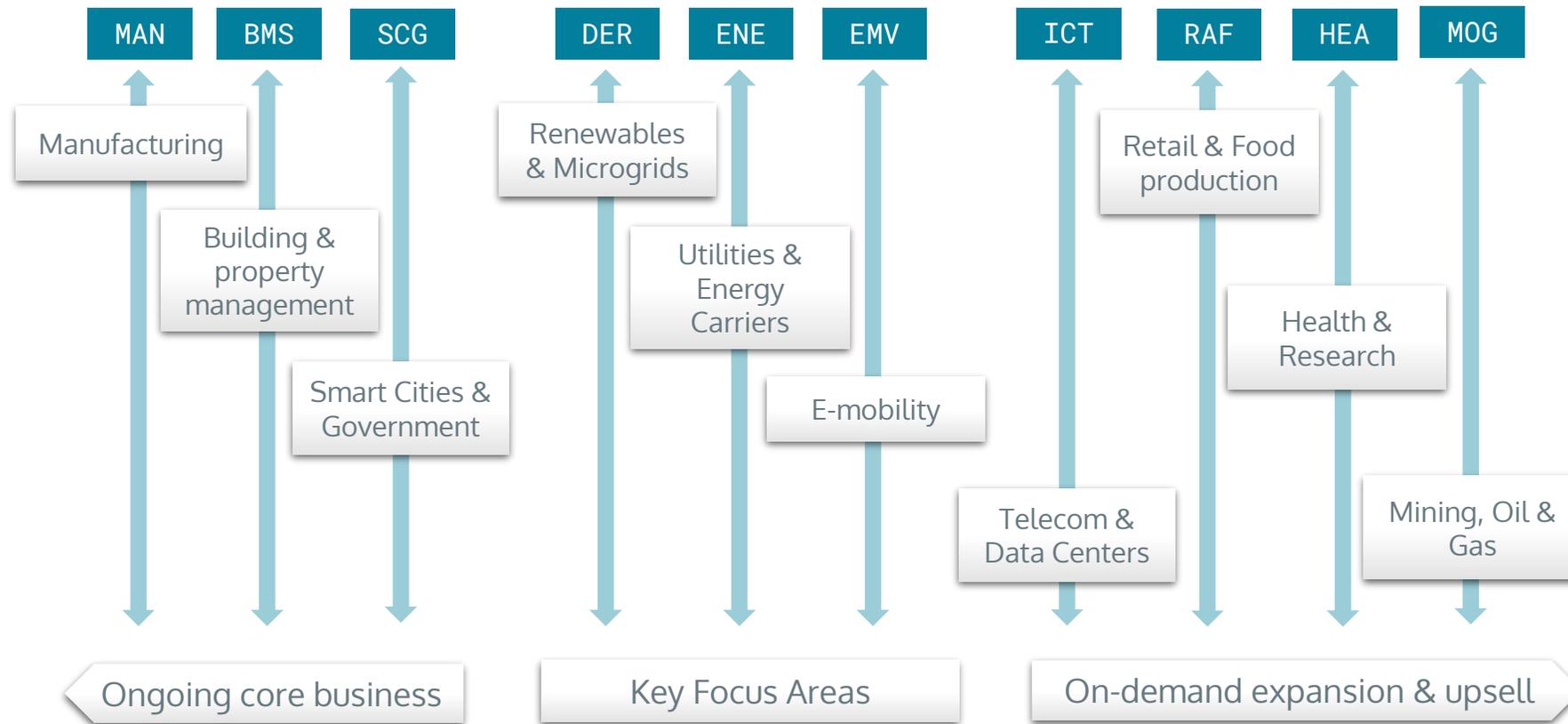
PRODUCT PORTFOLIO MATRIX

Three tiers based on functionality requirements

 5000 SERIES	MANAGEMENT – dynamic & adaptive energy optimization (consumption, production, storage), prediction of energy flows, demand response, big data analytics, self-sufficient sub-domains using FLOWBOX Alliance Edge Servers, APIs to external systems, support of systems certification
 3000 SERIES	CONTROL – active control of systems (e.g. HVAC), lighting, CCTV, onsite energy flows, load control, power source management, FLOWBOX Alliance Edge Gateways with FLOWBOX edge microservices
 1000 SERIES	MONITORING – sensor data collection, simple analytics / history / reports / logs, anomalies detection and proactive alerts, IoT cloud

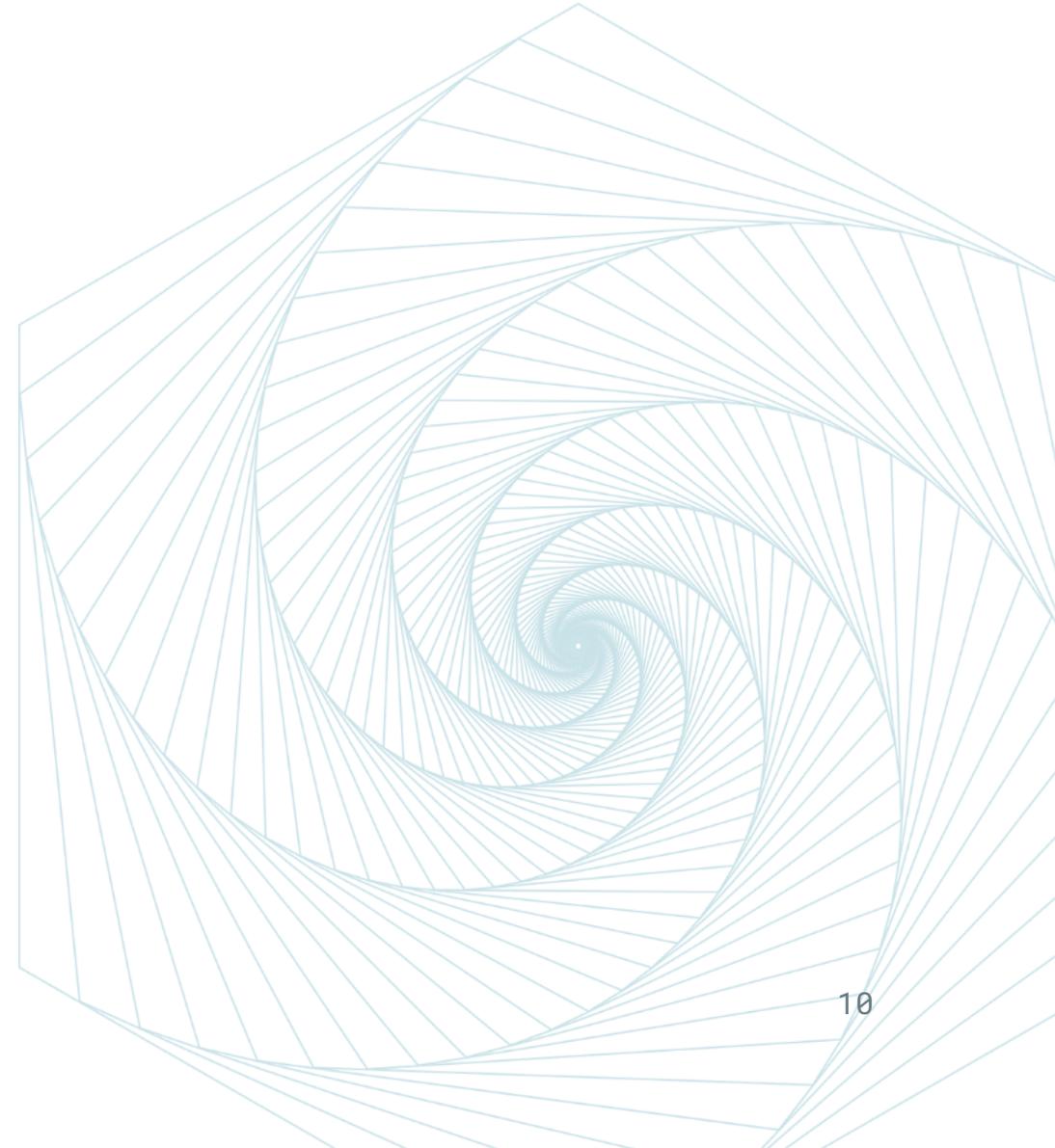
PRODUCT PORTFOLIO MATRIX

Product packages in ten vertical segments



SOLUTIONS FOR DIGITALIZATION

Main Functionalities



FLOWBOX IS MORE THAN ENERGY SAVINGS

Big data analytics

- + **Operational cost reduction** by energy consumption optimization
- + **Maintenance cost optimization** by monitoring and proactive alerts

Proactive control

- + **Failure time reduction and avoidance of downtime cost** by detection of anomalies, elimination of human errors and preventive & predictive maintenance
- + **Equipment lifetime increase** by operational cycle optimization

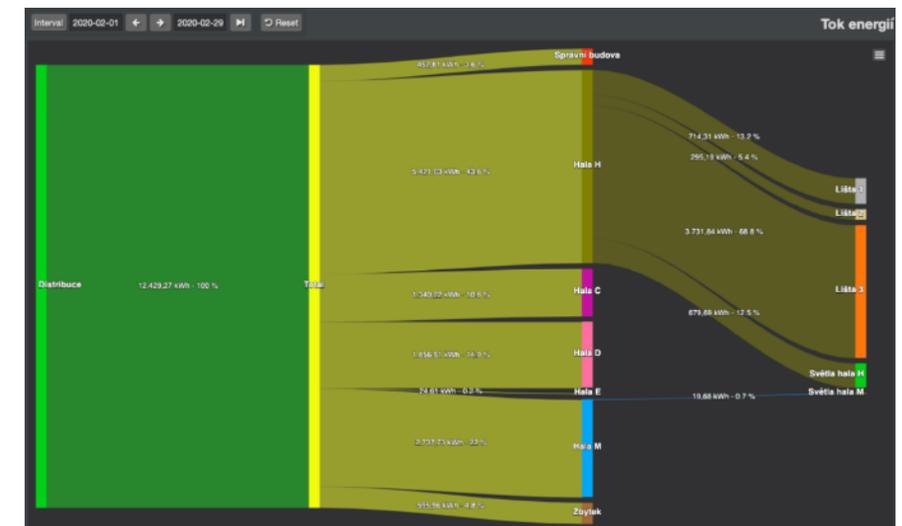
Optimization

- + **Improved quality of indoor environment** by control of comfort and CO₂ levels
- + **Compliance with new EU regulations regarding building automation systems** – EU 2018/844 directive for mandatory BACS systems in place by 2025
- + **Support of ISO 50001 certification** - ISO 50001 compliant energy management system

ENERGY MONITORING

Measurement of current total **energy consumption**; Measurement of energy intensive systems to derive a **map of energy flows** :

- + Electricity
- + Heat
- + Gas
- + Water
- + Technical gases (nitrogen, hydrogen, etc.)
- + Measurement of qualitative parameters if necessary (power factor, reverse energy, distortion)
- + Historical overviews
- + Analytical functions – approximation, correlation of curves, own graphs
- + Trends and forecasts



INTELLIGENT TEMPERATURE & AIR QUALITY MANAGEMENT (HVAC REGULATION)

- + **Heating, ventilation, air-conditioning** or recuperation controls.
Building is divided to zones
- + Temperature and air quality (CO₂ + quality) based on **individually controlled zones**
- + **Demand-based regulation** (e.g. occupancy) of HVAC and recuperation systems
- + **Smart ventilation based on CO₂** and air quality criteria
- + **Window/vent controls** (closing / opening) and monitoring in respect to HVAC operation
- + Quick **programmable buttons** for temperature selection
- + **Weakly heating /ventilation programs** based on custom preferences and settings



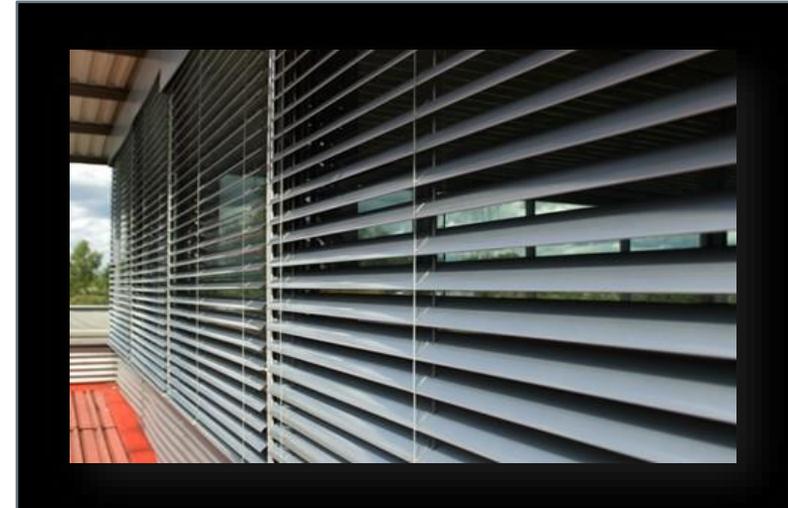
INTEGRATION WITH SECURITY & ACCESS SYSTEMS

- + **Triggers and control functions** based on interaction with a security system
- + Different control **profiles for Armed/Disarmed** objects
- + Possibility of **integration with vehicle identification system** (camera system, car registration identification)
- + Building **access rights management**
- + Access management and **gate control**



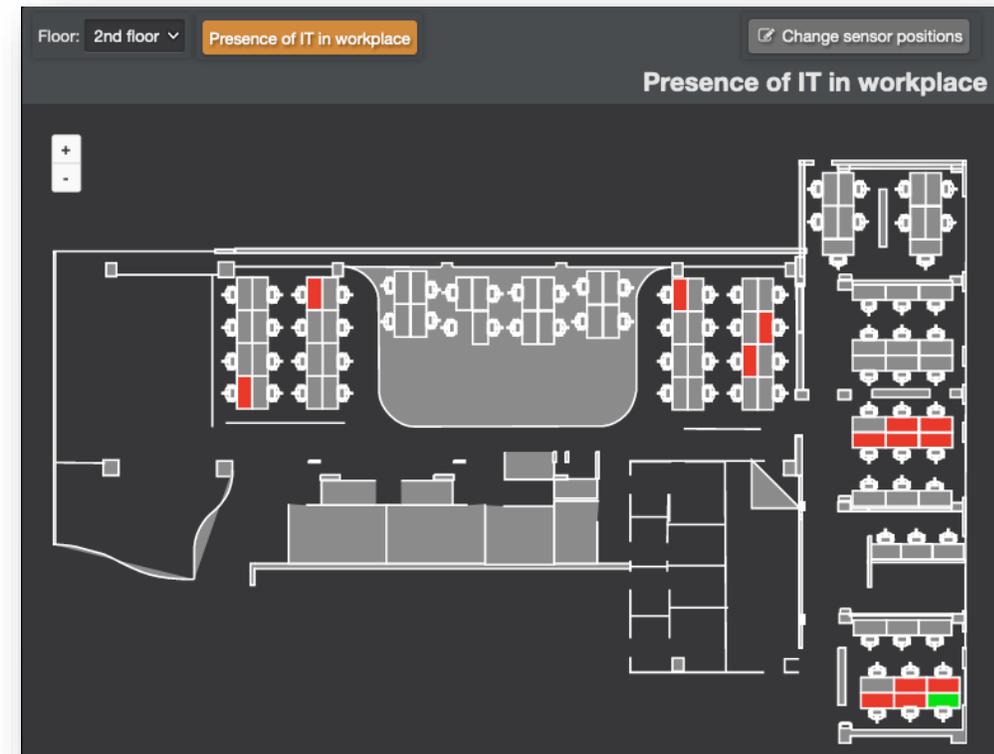
CONTROL OF BLINDS | LIGHTS

- + Controls of blinds / lights or other electronic appliances **according user-defined rules or manual interfaces**
- + Turn off all preferred electronic appliances and move blinds down during the night hours (or when a property is armed, etc.)
- + **Solar heat optimized control of the blinds**
- + **Natural air condition** - cool down rooms during a warm season by opening windows at night; move blinds down in day time to prevent overheating through a window
- + Keep a **light intensity on required level** based on the amount of external light through a window (or sky light)
- + Possibility of **manual over-ride**



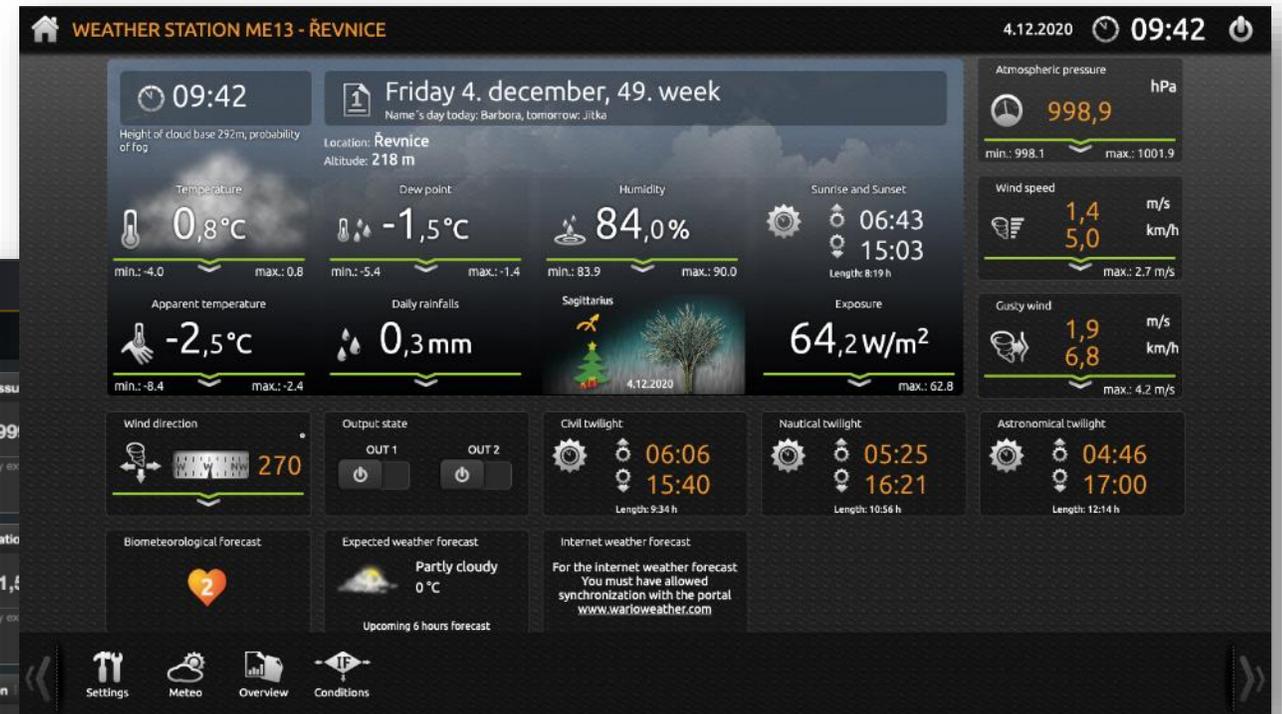
EMPLOYEE'S PRESENCE | SHARING OFFICE DESKS

- + Monitoring of the employee's presence in workspace
- + Sharing and reservation of the working space
- + HVAC regulation according employee's presence in workspace
- + Analytics for workspace optimisation



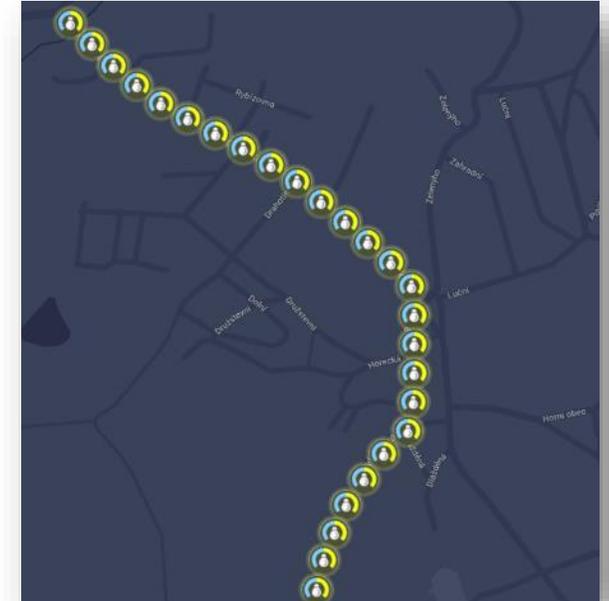
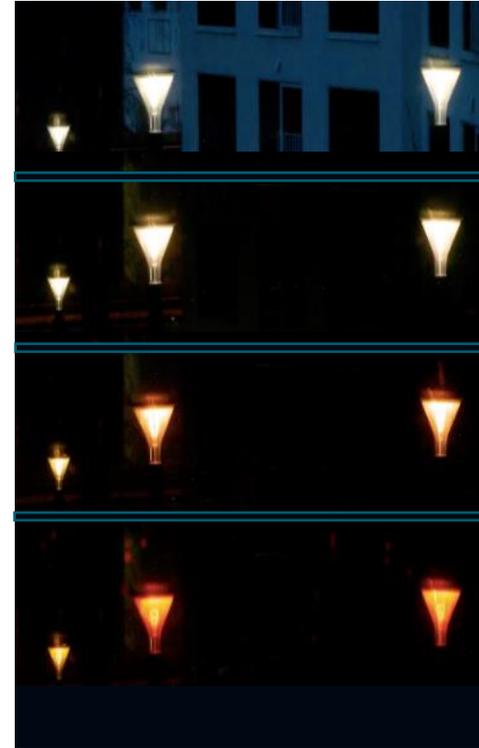
WEATHER CONDITIONS | FORECAST BASED REGULATION

- + Control triggers based on inputs from a weather station and/or based on a weather forecast



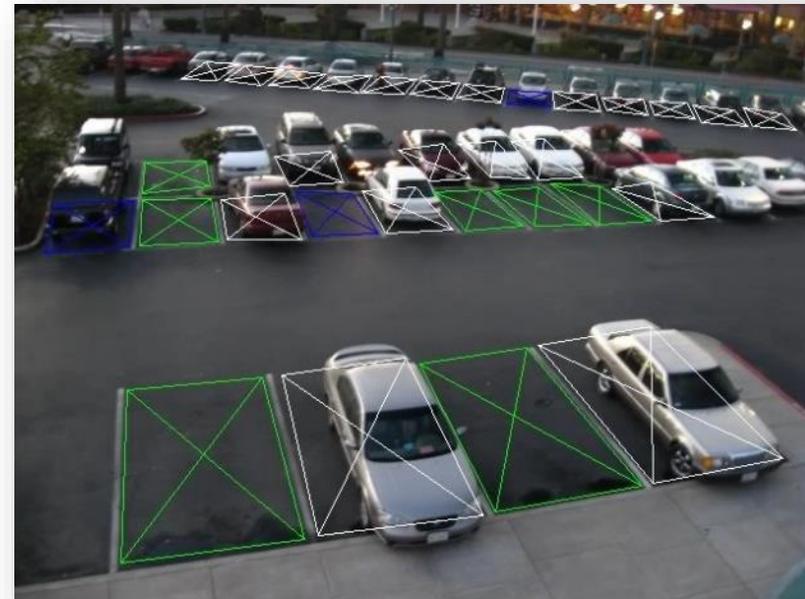
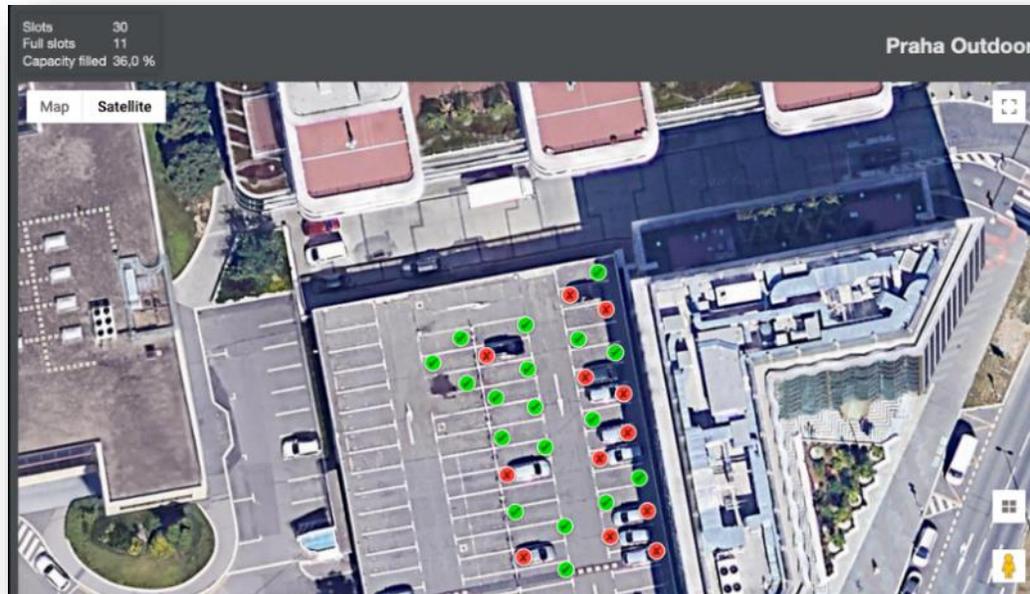
BIOLOGICAL DYNAMIC PUBLIC LIGHTING

- + The intensity and color of natural light is changing during the day
- + **Automatic & dynamic control** - removal of the toxic blue color



SMART & DYNAMIC PARKING

- + Integration of the parking detection systems – video analytics
- + **Parking zones status visualization**
- + Navigation to the free parking places
- + **Guide to 'forgotten' parking place**



PRODUCTIVITY AND MACHINE UTILIZATION

- + Tracking and correlation of **production costs of various customer orders**
- + Compares the number of items produced, the amount of energy consumed, the time of use of the production line and other parameters
- + Ability to **verify the efficiency** and productivity of processes
- + Measuring the **intensity of machine usage**
- + **Machine usage** compares the actual machine time (settings and run time) with the available time



PREVENTIVE AND PREDICTIVE MAINTENANCE

- + Any input and output (sensor, device, binary state) can be allowed to **record historical data**
- + Any input / output can have appropriate **thresholds set for normal operation** and trigger events in the event of unusual behavior
- + Alarm events can be e-mails, SMS or pushover (instant messaging) alarms or specific commands that can trigger other external visualized (flashing) or audible alarm systems
- + Specific mathematical **machine learning (ML/AI) algorithm for anomaly detection and early warnings** based on analyses of measurements and patterns of behavior (optional 3rd party sw module)



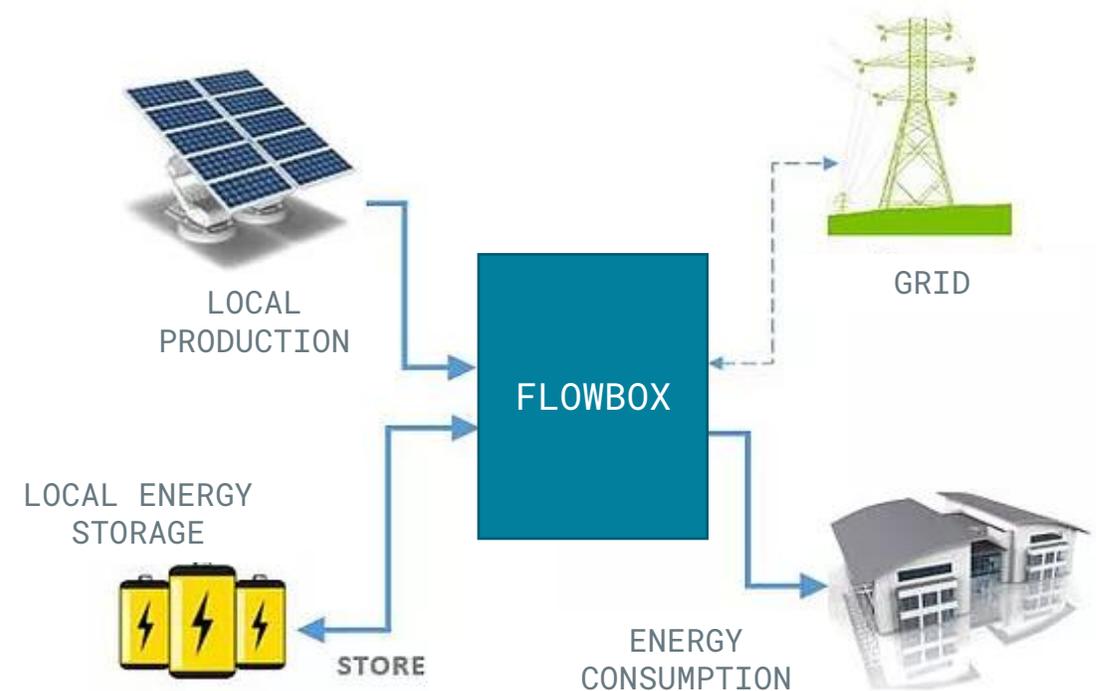
OPTIMIZATION OF MICROGRID OPERATION AND INTERWORKING WITH SMART GRID

- + Optimization of DER operations of **energy production, consumption and storage**
- + **Peak load management**
- + Internally as well as externally (DSO) triggered **demand response**
- + Support of **P2P energy markets**
- + Support of **citizen energy communities**
- + Possibility of 'island grid' operation

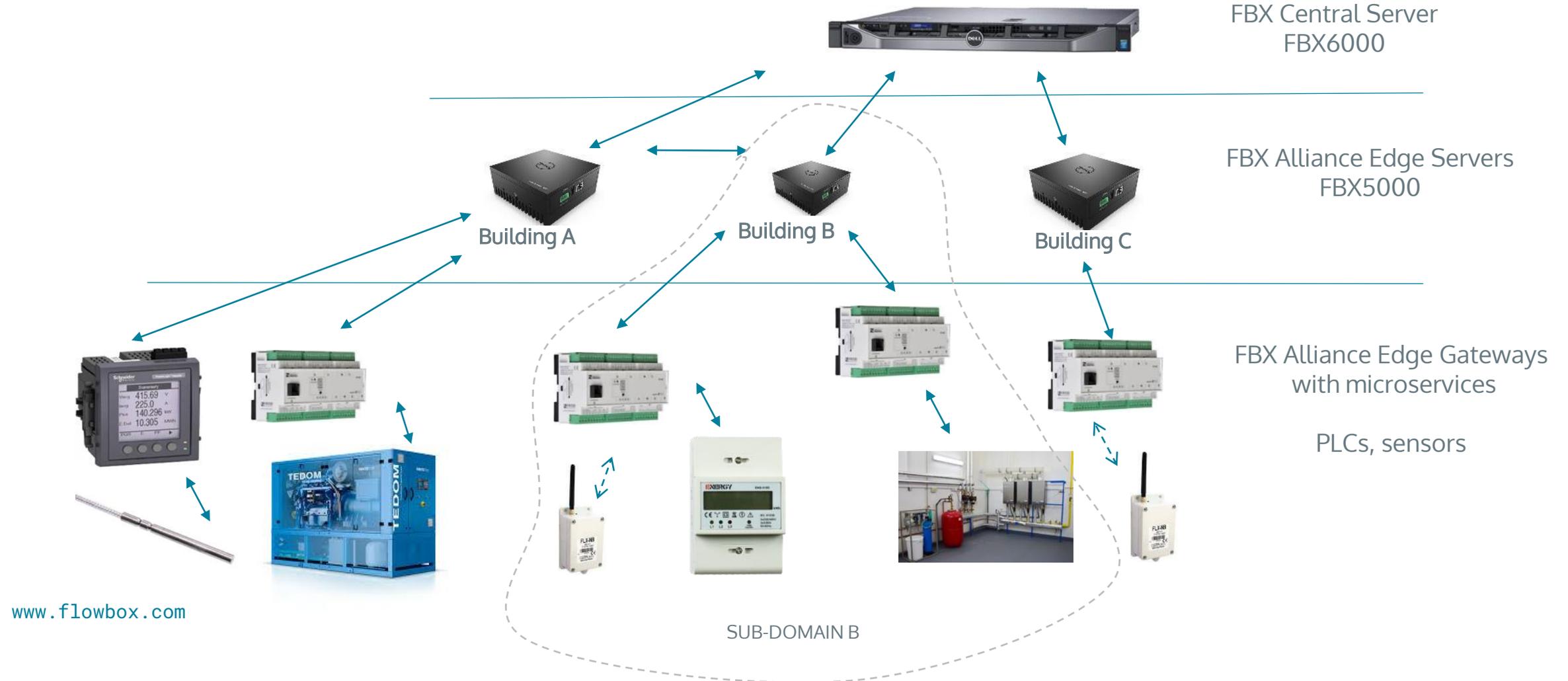


MANAGEMENT AND AGGREGATION OF LOCAL ENERGY CLUSTERS

- ⚡ Community as local energy producer and aggregator (DER) towards electricity grid
- ⚡ Citizen energy communities are part of the energy market as per EU directive 2019/944 art.16
- + Integration and management of Distributed Energy Resources (DER) / MICROGRIDS
- + Management of energy production and consumption
- + Storage of energy to batteries or other energy storage systems
- + Communication with Distribution System Operators (DSOs)



HIERARCHICAL ARCHITECTURE USING SUB-DOMAINS



SUPPORTED COMMUNICATION PROTOCOLS

- + FLOWBOX supports these communication protocols
 - + HTTP(S)/MQTT
 - + DALI
 - + M-BUS, WM-BUS
 - + MODBUS RTU/TCP
 - + BACNET IP
 - + OCPP
 - + OPC UA
 - + 1-Wire
 - + Sigfox, LoRa, NB-IoT
 - + ASCII
 - + KNX
 - + Other based on demand
- + FBX REST API
- + FLOWBOX can be integrated with 3rd party systems REST API (JSON, SOAP)
- + API supports 3 formats:
 - + plain – plain text
 - + json - JSON
 - + html



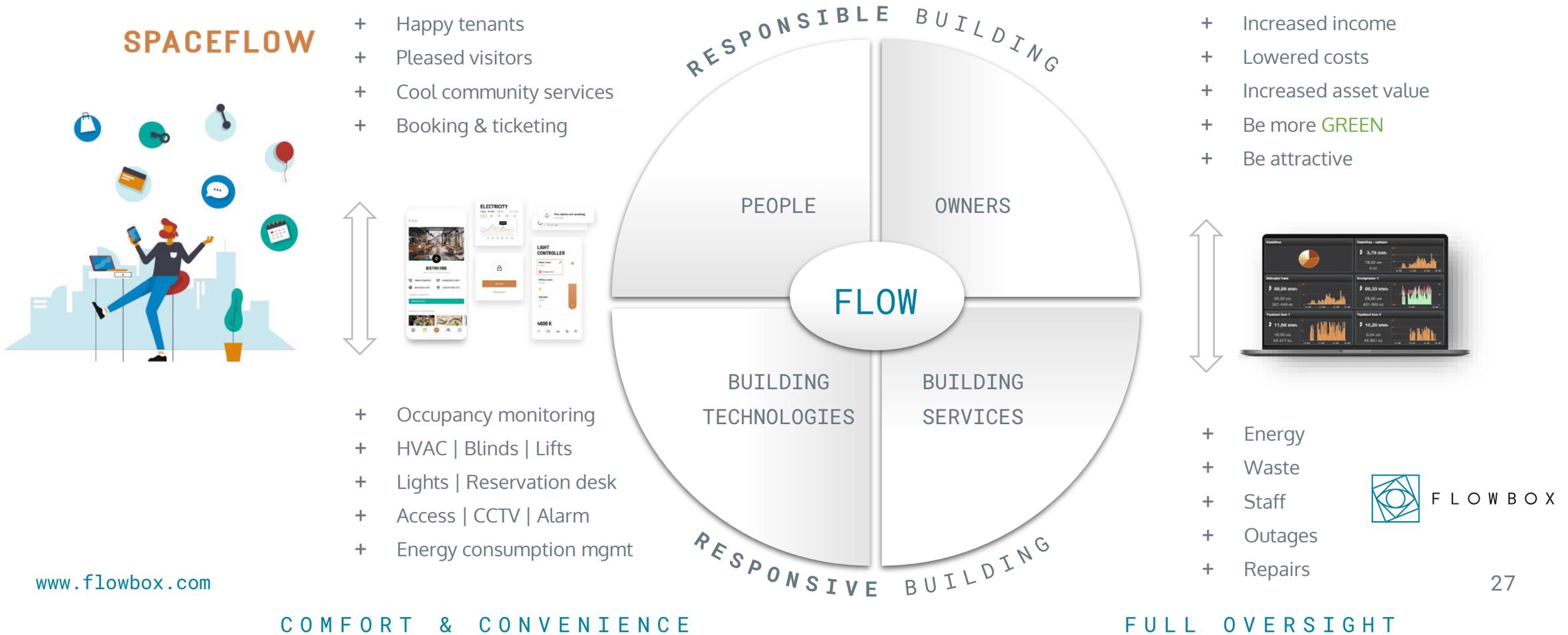
A MODERN, CLASS-LEADING USER INTERFACE

- + **Easy-to-use** interface suitable for non-trained personnel
- + **Web browser access** from 'anywhere', no need to install sw client
- + **Unlimited** multi-screen access via **PCs, mobile phones and tablets**
- + **Dashboards for developers** AND **customized dashboards for tenants / end customers**



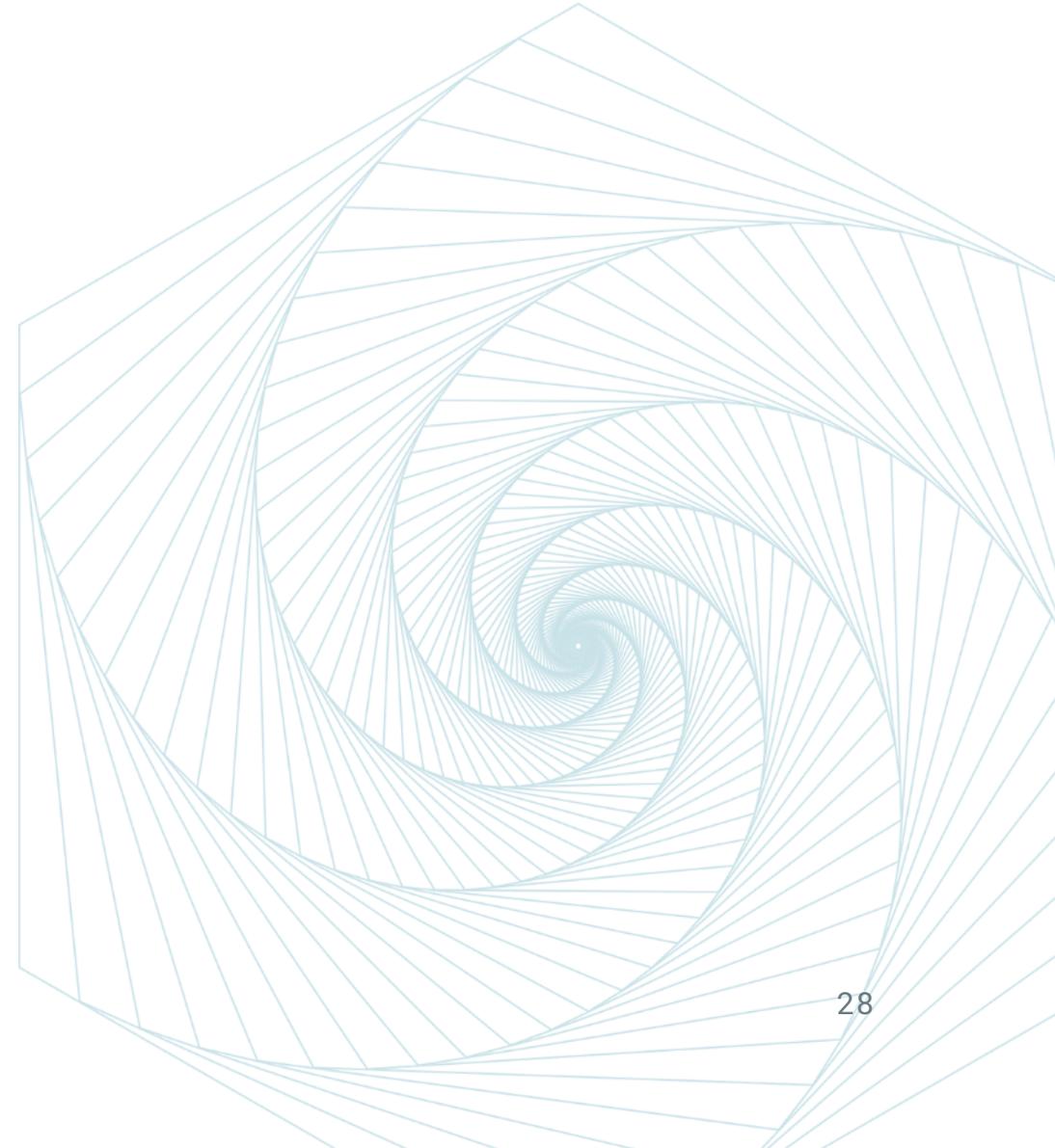
TECHNOLOGY + COMMUNITY = PEAK PERFORMANCE = FLOW

FLOW a unique proposition to turbocharge smart buildings



SOLUTIONS FOR DIGITALIZATION

Case studies





USE CASE INTRODUCTION

SMART BUILDINGS - DIGITALIZATION OF A COMPOUND COMPLEX

- + The complex named „Corso pod Lipami“
- + 40 flats in private ownership
- + Commercial premises - shops, restaurants, bar, offices, hotel
- + Brewery
- + Surrounding areas connected with the residential complex (pedestrian zone, water fountains, public lighting, garage,..)



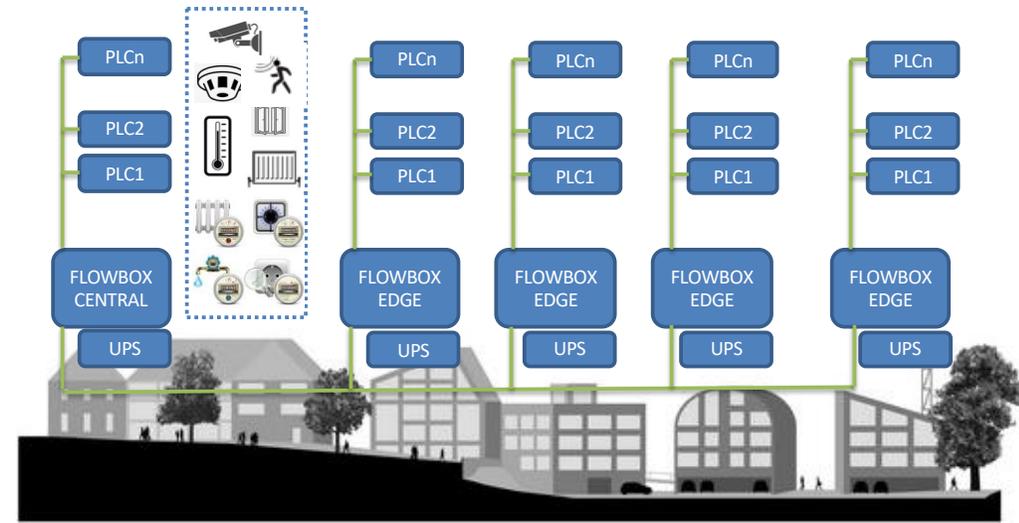
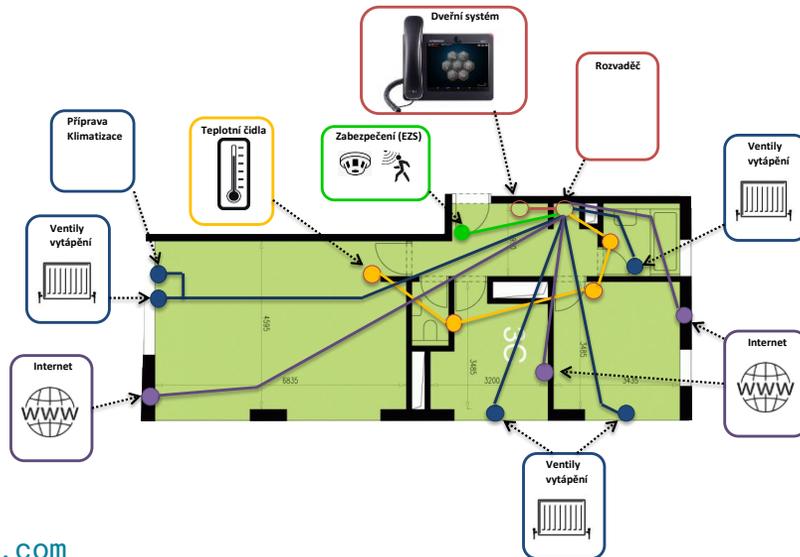


INVESTOR REQUIREMENTS

- + **Integrated access system**, access by code, chip cards, mobile phones, control of locks from apartments, garage entrance doors, control of elevators
- + Security camera **CCTV system** and electronic security system integration
- + **Measurement of energy consumption in real time for supervision and subsequent billing of costs** (electricity, water, gas, heat)
- + **Zone control** of heating, air conditioning and heat recovery units
- + Control of **shading** technology, blinds, shutters and awnings
- + Control of interior and exterior lighting including **biodynamic control of public lighting**
- + Control of operation of **water fountains and water tanks**
- + **Individual apartments ready for a 'Smart Household' operation and control**
- + **Virtual hotel Front Desk and remote hotel management**, unattended access, the ability to remotely control access, 'pre-heating' and preparation of hotel rooms according to occupancy
- + **Control and unlimited access via mobile phones, PCs or tablets**

FLOWBOX BMS5000 IMPLEMENTATION RESULTS

- + All technologies integrated into a single superior control system
- + Every technology keeps own control and can still operate autonomously if necessary
- + Remote control of private apartment owners (air-conditioning units, zone heating, lighting, etc.)
- + Supervision over the consumed energy





USE CASE INTRODUCTION

MANUFACTURING - DIGITALIZATION OF FACTORY PRODUCTION PLANT

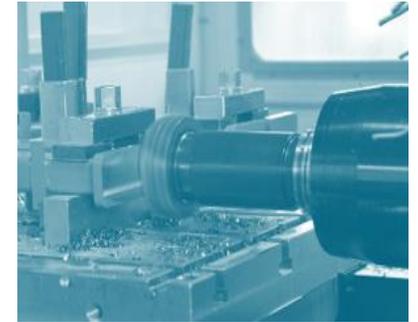
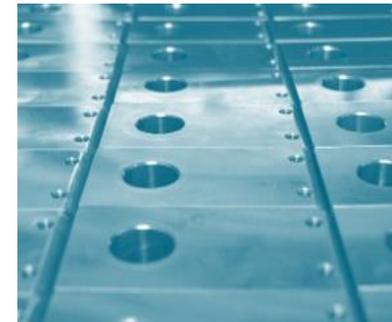
- + **Mechanical engineering company** - machining, laser cutting and welding of high-quality components for transport and industry
- + Large customers from abroad
- + Five associated halls
- + Consumption of electricity, natural gas, water and nitrogen





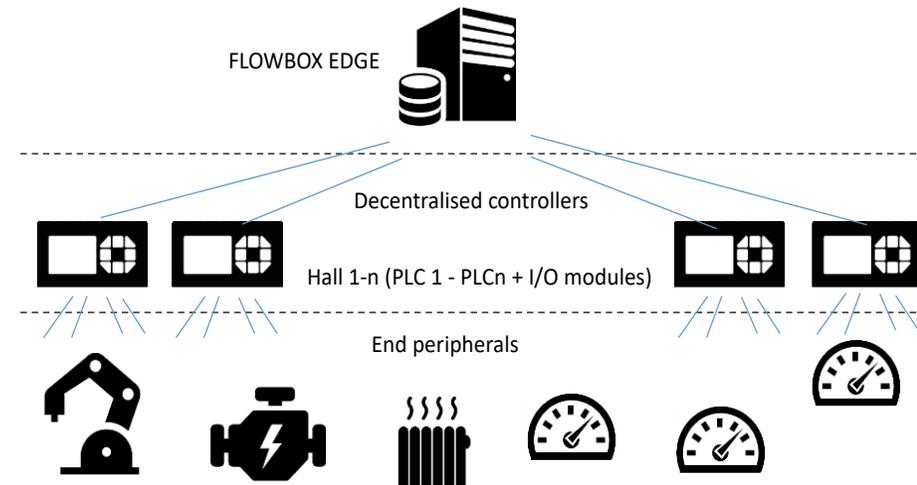
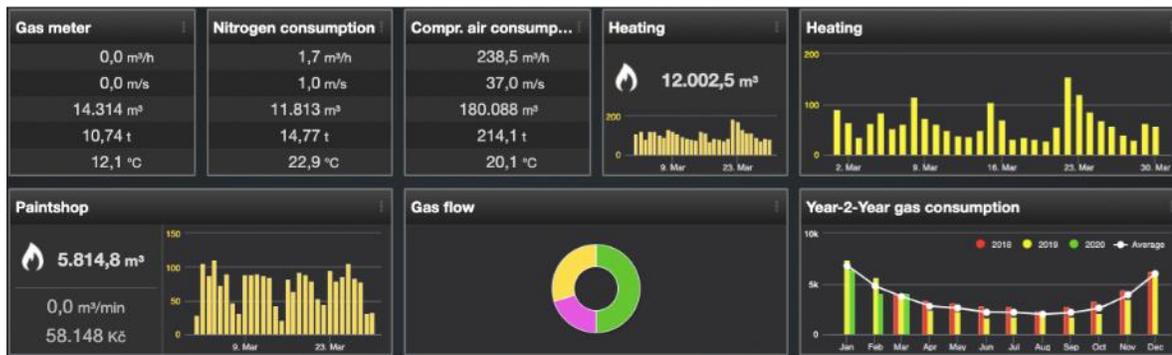
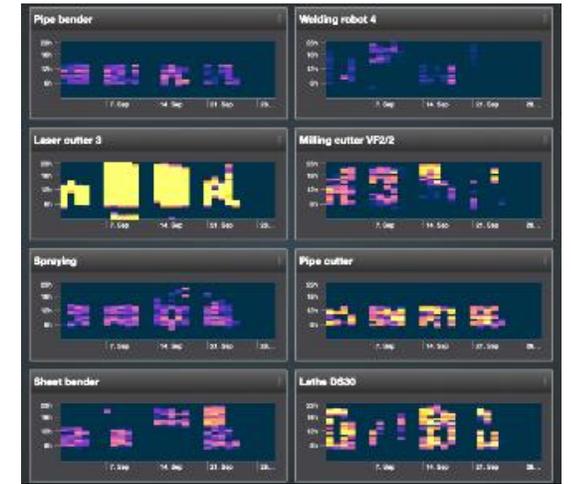
KEY GAPS AND CHALLENGES

- + **No supervision of energy consumption** and production productivity
- + **No centralized supervision** and management of the whole operation
- + Slow or missing response to failures and outages
- + Unauthorized interference of workers



FLOWBOX MAN5000 IMPLEMENTATION RESULTS

- + Annual savings of 37 percent by intelligent Flowbox energy management
- + Increased production effectiveness and capacity by enabling machine diagnostics
- + Identified causes of wastage by monitoring and analytics
- + Improved control of operations based on historical and actual data
- + Reduction of costs of lighting (40%), heating, and air handling have





USE CASE INTRODUCTION

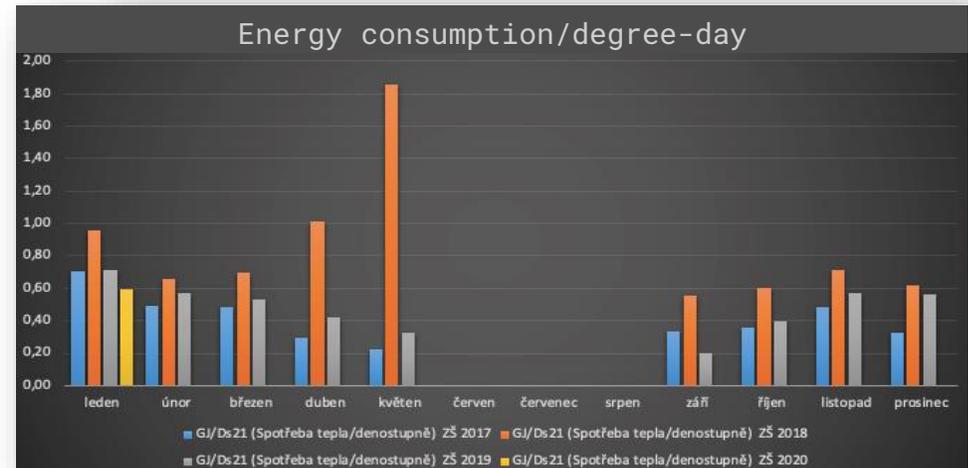
SMART CITY - DIGITALIZATION OF EDUCATIONAL COMPLEX

- + Town of Zruč nad Sázavou
- + 7 blocks of educational complex including college, art school and sports hall.



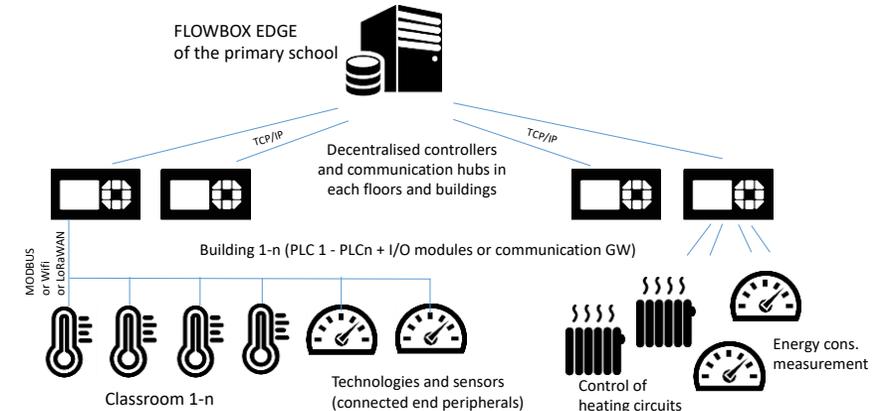
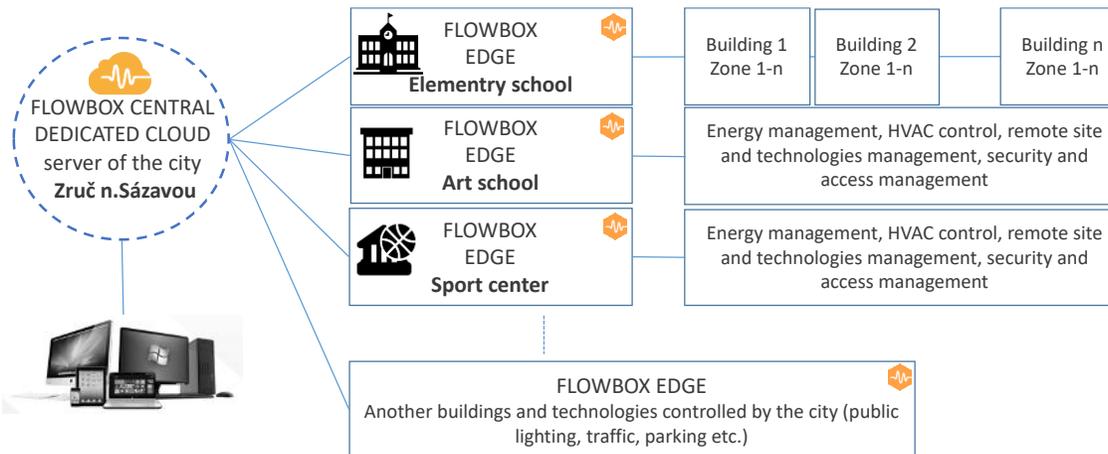
CHALLENGES FLOWBOX HELPED TO SOLVE

- + **Poor air quality** due to insulation and sealing of the buildings
- + **Waste of energy and water** in buildings
- + **Outages and failures** of technology due to insufficient control
- + **No connection of security systems**



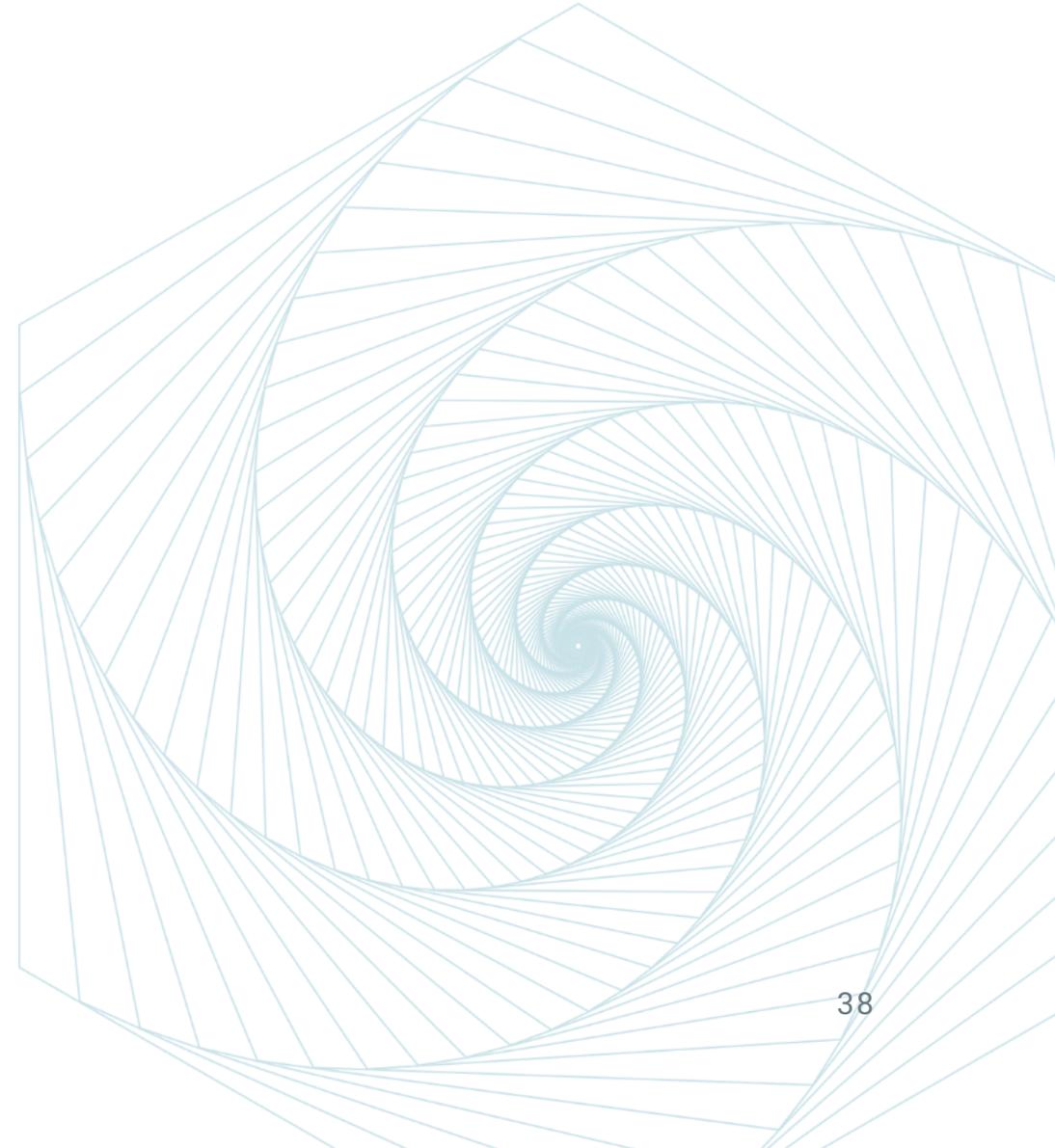
FLOWBOX SCG5000 IMPLEMENTATION RESULTS

- + City cloud **central server FBX6000** connected with **buildings in sub-domains**
- + Each building keeps autonomous operation and is equipped with **Flowbox Alliance Gateway (FAG)** servers
- + Optimization of operation and control of **HVAC, lighting and shading**
- + Ready to integrate **additional control domains** - kindergartens, hospitals, sports facilities, nursing homes; as well as public lighting, sewage and waste systems, traffic and service systems, parking, CCTV systems, etc.



SOLUTIONS FOR DIGITALIZATION

Conclusion



Hundreds of technologies made by different manufacturers are connected and optimized by a single hardware-agnostic FLOWBOX digitalization platform

**BOSCH****TOSHIBA****VIESSMANN****Rockwell
Automation****Honeywell**

OUR SOLUTION DELIVERY

Assessment of your needs and challenges, proposal of implementation steps

Delivery of entire solution, installation and implementation

PROCESS

- + Requirements
- + Diagnosis and solution recommendation
- + Contract or order
- + Technical design and time plan
- + Installation and configuration
- + Training and support
- + Support of compliancy with new EU legislation (e.g. EU 2018/844), energy certification (e.g. ISO 50001) or energy audits (e.g. ASHRAE, IEA-EBC, IGA)



FLOWBOX

Real-time

Cloud

Energy
audits

DIGITALIZE YOUR BUSINESS WITH FLOWBOX

Thank You

Dashboarding

AI

DIN EN
16247

ISO 50001

info@flowbox.com

www.flowbox.com

ISO 50003